Claims

1. An arrangement for storing electrical energy comprising:

an electric charge source (110; 410) adapted to produce a DC-system voltage (V_{TOT}) between a first terminal (T1) and a second terminal (T2),

a number of electrical storage modules (131, 132; 430A, 430B, 430C) connected in series between the first terminal (T1) and the second terminal (T2), and

a DC-to-DC converter (120; 420) coupled to the electric charge source (110; 410) and to each of the electrical storage modules (131, 132; 430A, 430B, 430C), the DC-to-DC converter being adapted to receive incoming power from the electric charge source (110; 410) and deliver a voltage fraction (V_1, V_2; V_A, V_B, V_C) of the DC-system voltage (V_{TOT}) to each of the modules (131, 132; 430A, 430B, 430C), **characterized in that** the DC-to-DC converter (120; 420) is adapted to control each of the voltage fractions (V_1, V_2; V_A, V_B, V_C) to vary over time (t) within an interval (V_D) around a respective nominal module voltage (V_{1n}, V_{2n}; V_{An}, V_{Bn}, V_{Cn}).

2. An arrangement according to claim 1, **characterized in that** the interval (V_D) represents a voltage variation of less than 25% of any of the nominal module voltages (V_{1n}, V_{2n}; V_{An}, V_{Bn}, V_{Cn}).

3. An arrangement according to any one of the preceding claims, **characterized in that** the DC-to-DC converter (120) is adapted to control the respective voltage fractions (V_1, V_2) over the electrical storage modules (131, 132) such that an average interval (τ_{super1}, τ_{super2}) during which the voltage fraction (V_1, V_2) exceeds the nominal module voltage (V_{1n}, V_{2n}) is substantially equal with respect to all the modules (131, 132).

4. An arrangement according to any one of the preceding claims, **characterized in that** the DC-to-DC converter (120) is adapted to control the respective voltage fractions (V_1, V_2) over

the electrical storage modules (131, 132) such that an average fraction of the DC-system voltage (V_{TOT}) being distributed to each module is substantially equally large for all the modules (131, 132).

5. An arrangement according to any one of the preceding claims, **characterized in that** two or more of the electrical storage modules (131, 132; 430A, 430B, 430C) are included in a common battery unit having a separate set of access points for each module, each of the access points being coupled to the DC-to-DC converter (120; 420).

6. An arrangement according to any one of the preceding claims, **characterized in that** the number of electrical storage modules (131, 132) is equal to two.

7. An arrangement according to any one of the preceding claims, **characterized in that** the electrical storage modules (131, 132; 430A, 430B, 430C) are adapted to provide power to an electrical system of a vehicle via the first and second terminals (T1, T2).

8. An arrangement according to any one of the preceding claims, **characterized in that** the electric charge source (110; 410) is an electric generator.

9. A motor vehicle, **characterized in that** it comprises an arrangement for storing electrical energy according to any one of the claims 1 – 8.

10. A method of charging a number of electrical storage modules (131, 132; 430A, 430B, 430C) connected in series between a first terminal (T1) and a second terminal (T2), comprising the steps of:

receiving a DC-system voltage (V_{TOT}) between the first terminal (T1) and the second terminal (T2),

DC-to-DC converting the DC-system voltage (V_{TOT}) into one voltage fraction (V_1, V_2; V_A, V_B, V_C) per module (131, 132; 430A, 430B, 430C), and

delivering the respective voltage fraction (V_1, V_2; V_A, V_B, V_C) to each of the modules (131, 132; 430A, 430B, 430C), **characterized by** the step of:

controlling each of the voltage fractions (V_1, V_2; V_A, V_B, V_C) to vary over time (t) within an interval (V_D) around a respective nominal module voltage (V_{1n}, V_{2n}; V_{An}, V_{Bn}, V_{Cn}).

11. A method according to claim 10, **characterized by** the interval (V_D) representing a voltage variation of less than 25% of any of the nominal module voltages (V_{1n}, V_{2n}; V_{An}, V_{Bn}, V_{Cn}).

12. A method according to any one of the claims 10 or 11, **characterized by** controlling the respective voltage fractions (V_1, V_2) over the electrical storage modules (131, 132) such that an average interval (τ_{super1}, τ_{super2}) during which the voltage fraction (V_1, V_2) exceeds the nominal module voltage (V_{1n}, V_{2n}) is substantially equal with respect to all the modules (131, 132).

13. A method according to any one of the claims 10 - 12, **characterized by** controlling the respective voltage fractions (V_1, V_2) over the electrical storage modules (131, 132) such that an average fraction of the DC-system voltage (V_{TOT}) being distributed to each module is substantially equally large for all the modules (131, 132).

14. A method according to any one of the claims 10 - 13, **characterized by** the number of electrical storage modules (131, 132) being equal to two.

15. A computer program directly loadable into the internal memory of a computer, comprising software for controlling the steps of any of the claims 10 – 14 when said program is run on the computer.

16. A computer readable medium, having a program recorded thereon, where the program is to make a computer control the steps of any of the claims 10 – 14.